Instructional Leaflet **IL04209001E** Effective May 2011
Supersedes October 2009 PUB52052

C441 Motor Insight Overload Relay (Line Powered) Product Installation Leaflet

⚠DANGER/PELIGRO

HAZARDOUS VOLTAGE CAN CAUSE ELECTRIC SHOCK AND BURNS. TO AVOID SHOCK HAZARD, DISCONNECT ALL POWER BEFORE ANY WORK IS PERFORMED ON THIS DEVICE. FAILURE TO DO SO WILL RESULT IN PERSONAL INJURY, DEATH, OR SUBSTANTIAL PROPERTY DAMAGE.

UNE TENSION ÉLECTRIQUE DANGEREUSE PEUT CAUSER DES CHOCS ÉLECTRIQUES ET DES BRÛLURES. POUR ÉVITER DES CHOCS ÉLECTRIQUES, DÉBRANCHER L'ALIMENTATION AVANT D'Y EFFECTUER DU TRAVAIL. L'INOBSERVATION DE CES INSTRUCTIONS ENTRAÎNERA DES BLESSURES CORPORELLES GRAVES, LA MORT OU DES DÉGÂTS MATÉRIELS SUBSTANTIELS.

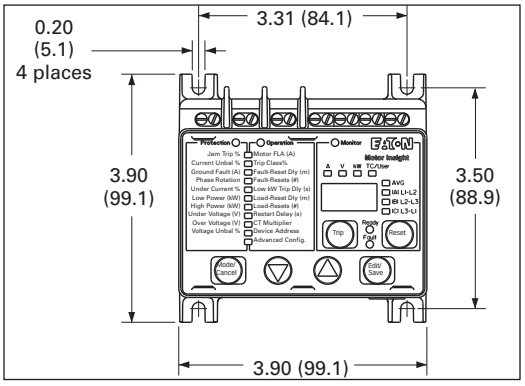


Figure 1. Mount with 10-32 Hardware Torque to 25 in-lb

Voltage ratings

Important note: The nominal L1-L2 voltage must meet the specifications listed in **Table 1** to prevent damage to the Motor Insight™ overload relay.

The Motor Insight overload relay is powered by the line voltage connection between L1-L2. This voltage range for the various models is given in the following table. Voltage tolerance: +10%/–15%.

Table 1. Voltage Range

Nominal Rating	Catalog Number	Input Voltage Range
(B) 240V	C441BA, C441BB	200–240 Vac; (50/60 Hz)
(C) 480V	C441CA, C441CB	380–415 Vac; (50/60 Hz) and 440–480 Vac; (60 Hz)
(D) 600V	C441DA, C441DB	575–600 Vac; (60 Hz)

Wiring

Pass motor leads through the Motor Insight overload relay CT pass-through. If multiple passes of the motor leads are required, make sure that the current flow is from top to bottom through the Motor Insight overload relay. If external CTs are used, pass the 5A secondary of the external CTs through the Motor Insight overload relay internal CTs. See **Table 3** for wrap and CT multiplier.

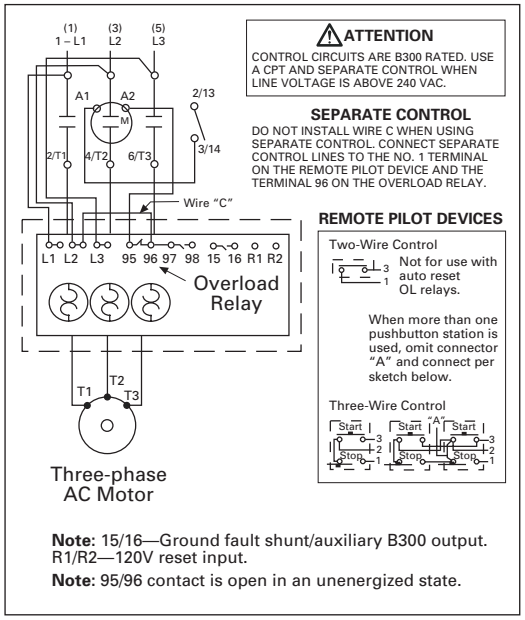

(1)
1 – L1
(3)
L2
(5)
L3
A1
A2
M
2/13
3/14
2/T1
4/T2
6/T3
Wire "C"
L1 L2 L3 95 96 97 98 15 16 R1 R2
Overload Relay
T1
T2
T3
Three-phase AC Motor
⚠ATTENTION
CONTROL CIRCUITS ARE B300 RATED. USE A CPT AND SEPARATE CONTROL WHEN LINE VOLTAGE IS ABOVE 240 VAC.
SEPARATE CONTROL
DO NOT INSTALL WIRE C WHEN USING SEPARATE CONTROL. CONNECT SEPARATE CONTROL LINES TO THE NO. 1 TERMINAL ON THE REMOTE PILOT DEVICE AND THE TERMINAL 96 ON THE OVERLOAD RELAY.
REMOTE PILOT DEVICES
Two-Wire Control
Not for use with auto reset OL relays.
When more than one pushbutton station is used, omit connector "A" and connect per sketch below.
Three-Wire Control
Start
Stop
"A"
Note: 15/16—Ground fault shunt/auxiliary B300 output. R1/R2—120V reset input.
Note: 95/96 contact is open in an unenergized state.

Figure 2. Typical Starter Application Sample Wiring Diagram

The Motor Insight overload relay is factory set for manual reset operation. See **Table 5** for automatic reset operation.

⚠WARNING/AVERTISSEMENT

AUTOMATIC RESET IS NOT INTENDED FOR TWO-WIRE CONTROL DEVICES.

CE DISPOSITIF DE REENCLENCHEMENT AUTOMATIQUE NE CONVIENT PAS AUX COMMANDES À DEUX CONDUCTEURS.

Powering Business Worldwide

Terminal connections

The Motor Insight overload relay provides the following terminal connections. NC 95/96 contact is open when the device is unenergized.

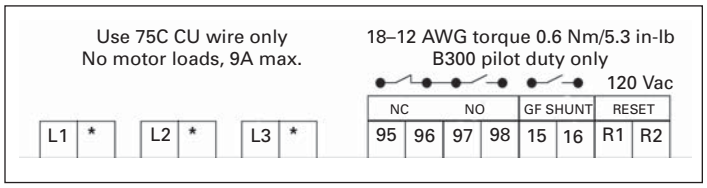


Figure 3. Terminal Connection Diagram

Table 2. Terminal Connection Specifications

Name	Designation	Input	Description
Line voltage	L1, L2, L3	Line voltage	Three-phase line voltage input - L1, L2, L3 connections must correspond to the respective CT1, CT2, CT3 current leads - Inputs must have short circuit protection - Terminal provided for wiring control power transformer (9A maximum capacity)
Fault relay	96 and 97 (common) 95/96 97/98	UL® 508 B300	Form C contact: - 95/96 contact opens when the unit is faulted - 97/98 contact closes when the unit is faulted or unpowered - 96 and 97 are common
GF shunt	15 16	UL 508 B300	Form A contact: Contact closes when a ground fault is active
Reset input	R1 R2	120 Vac +10%/ –15%	Fault reset input

⚠CAUTION/ATTENTION

THE OPENING OF A BRANCH-CIRCUIT PROTECTIVE DEVICE MAY BE AN INDICATION THAT A FAULT HAS BEEN INTERRUPTED. TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CURRENT-CARRYING PARTS AND OTHER COMPONENTS OF THE CONTROLLER SHOULD BE EXAMINED AND REPLACED IF DAMAGED. IF BURNOUT OF THE ELEMENT OF AN OVERLOAD RELAY OCCURS, THE COMPLETE OVERLOAD RELAY SHOULD BE REPLACED.

LE DÉCLENCHEMENT DU DISPOSITIF DE PROTECTION DES DÉRIVATIONS PEUT SIGNIFIER QU'UN COURANT DE DÉFAUT A ÉTÉ INTERROMPU. POUR RÉDUIRE LE RISQUE D'INCENDIE OU DE CHOC ÉLECTRIQUE, LES PIÈCES PORTEUSES DE COURANT ET LES AUTRES COMPOSANTS DE LA COMMANDE DOIVENT ÊTRE VÉRIFIÉS ET REMPLACÉS S'ILS SONT ENDOMMAGÉS. SI L'ÉLÉMENT PORTEUR DE COURANT DU RELAIS DE SURCHARGE GRILLE, LE RELAIS DE SURCHARGE ENTIER DOIT ÊTRE REMPLACÉ.

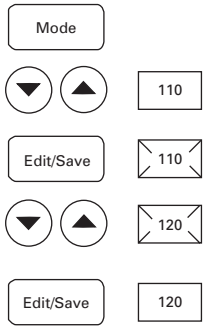
Initial configuration

On initial power-up, the Motor Insight overload relay displays a "rOF" message. This indicates that the fault relay is OFF. Configure the device for the application prior to resetting the device.

To turn the fault relay OFF, press the Trip button.

Programming set points

The Motor Insight overload relay is easy to configure. Viewing and editing protection set points can be performed in the Protection and Operation Mode. The following steps outline the procedure for modifying any of the set points.


Step 1: Press Mode button until Protection or Operation Mode LED is lit.
Mode
Step 2: Press Up or Down button until the desired O/P LED is lit. Display shows the current parameter value.
110
Step 3: Press the Edit/Save button. The display now shows the parameter value but it is now flashing.
Edit/Save
110
Step 4: Use the Up/Down buttons to adjust the parameter to the desired value.
120
Step 5: Press the Edit/Save button. The display now shows the new parameter value that has been saved by the device.
Edit/Save
120

Note: Scrolling up (or down) to the top (or bottom) of the range can disable a protection feature. The display will indicate OFF when a protection parameter is disabled. The OFF setting is not available when the protection parameter is configured for alarm-no-trip operation.

The Motor Insight overload relay has a display lock feature to prevent accidental modification to the Motor Protection settings. Consult the user manual, MN04209001E, for details.

Configuring the thermal overload protection feature

Motor Insight overload relay features electronic motor overload protection. This feature protects the motor and power wiring against overheating caused by excessive current for extended periods of time.

The trip current is programmed by entering the motor full load amperes (FLA) using the motor FLA parameter. The trip class (5 to 30) is set using the Trip Class parameter.

The FLA range of the overload relay can be modified with the use of multiple turns through the CTs or with the use of external CTs. Use the following tables to appropriately configure the device for the application. If the application requires the FLA range to be extended, program the CT multiplier first.

Table 3A. FLA Range

Current Range	Catalog Number	Motor FLA	Number of Conductors Through CT	CT Multiplier
A (1–9A)	C441BA C441CA C441DA	1–5 2–9 60–135 120–270 240–540	2 1 1 1 1	2 1 150–(150:5) 300–(300:5) 600–(600:5)
B (5–90A)	C441BB C441CB C441DB	5–22.5 6.67–30 10–45 20–90	4 3 2 1	4 3 2 1

Important note: After an overload trip, Motor Insight relay cannot be reset until the thermal model decays to a thermal capacity that is thermally safe for a motor restart. Cycling the power does not reset the thermal model.

Table 3B. Service Factor FLA Setting

Service Factor	Motor FLA Setting
>1.15	Enter the motor nameplate FLA
=1.10	Enter the FLA as (1.1* nameplate FLA/1.15)

Protection set point summary table

Table 4. Protection Menu Set Points

Type	Trip Threshold	Trip Delay *	Default(s)	Notes
Jam	150–400% of FLA	1–20 seconds	400%, 2 seconds	This protection is disabled by default.
Current unbalance	1–30%	1–20 seconds	15%, 10 seconds	—
Ground fault	0.3–2.0A (A) 3.0–20A (B)	1–60 seconds	1A (A) 10A (B) 2 seconds	See user manual for ranges when CT multiplier is not set to 1.
Phase reversal	0 = Don't care 1 = ACB 2 = ABC	2 seconds (not adjustable)	1 = ACB	By default, the phase reversal fault is in alarm-no-trip mode. The MI fault relay will not close in a phase reversal condition.
Undercurrent	10–90% of FLA	1–60 seconds	50%, 5 seconds	This protection is disabled by default.
Low power (kW)	See user manual for ranges	1–60 seconds	5 seconds	This protection is disabled by default.
High power (kW)	See user manual for ranges	1–60 seconds	5 seconds	This protection is disabled by default.
Overvoltage	170–264 (B) 323–528 (C) 489–660 (D)	1– 20 seconds	264 (B) 528 (C) 632 (D) 10 seconds	By default, the overvoltage fault is in alarm-no-trip mode. The MI fault relay will not close in an overvoltage condition.
Undervoltage	170–264 (B) 323–528 (C) 489–660 (D)	1–20 seconds	216 (B) 432 (C) 540 (D) 10 seconds	By default, the undervoltage fault is in alarm-no-trip mode. The MI fault relay will not close in an undervoltage condition.
Voltage unbalance	1–20%	1–20 seconds	6%, 10 seconds	By default, the voltage imbalance fault is in alarm-no-trip mode. The MI fault relay will not close in a voltage unbalance condition.

*Trip delay settings can be adjusted using the Advanced Configuration parameter.

Operation set point summary

⚠WARNING

THE MOTOR INSIGHT OVERLOAD RELAY MAY RESET AT ANY TIME, ENABLING A MOTOR START. WHEN FAULTED (FAULT LED IS ON), THE READY LED WILL FLASH WHEN AN AUTO RESET IS PENDING.

⚠AVERTISSEMENT

LE RELAIS DE SURCHARGE MOTOR INSIGHT PEUT SE RÉINITIALISER À TOUT MOMENT PERMETTANT UN DÉMARRAGE DU MOTEUR. LORSQUE SE PRODUIT UNE DÉFAILLANCE (LE VOYANT DE DÉFAILLANCE DEL EST ACTIVÉ), LE VOYANT DEL « READY » CLIGNOTE LORSQU'UNE RÉINITIALISATION AUTOMATIQUE EST EN COURS.

Table 5. Operational Menu Set Points

Type	Range	Default(s)	Notes
Motor FLA	See **Table 3**	2A (A) 20A (B)	—
Trip class	5–30	20	—
Fault reset dly (m)	2–500 minutes	8 minutes	This is the delay after a motor fault (thermal overload, jam, current unbalance). This timer inhibits a reset so that the motor can cool down.
Fault reset (#)	0–4, A OL.1-OL.4, OL.A	1	Number of auto-reset attempts after a motor fault. 0 = manual, A = auto, 1–4 = semi-auto. The fault reset (#) will be restored after the motor has been running for 15 minutes. The OL. prefix indicates that the setting applies to overload trips only.
Low kW trip dly (s)	1–60 seconds	5 seconds	
Load reset dly (s)	2–500 minutes or automatic	20 minutes	This is the delay after an undercurrent, low power, or high power trip. A = automatic—Load reset delays are computed based on previous motor run times.
Load resets (#)	0–4, A	1	Number of auto-reset attempts after a load fault. 0 = manual, 1– 4 = semi-auto, A = automatic. The load reset (#) will be restored after the motor has been running for 70 seconds.
Restart delay time	0–500 seconds	10 seconds	Inhibits a start after power-up. Useful when multiple motors are brought online at the same time.
CT multiplier	1, 2,150, 300, 600 (A) 1, 2, 3, 4 (B)	1	If using multiple turns or external CTs, this parameter must be configured appropriately.
Device address	1–247	1	—
Advanced config	—	—	See user manual MN04209001E.

Fault codes

After a trip, the Motor Insight overload relay will indicate the trip reason with a fault code on the display by illuminating the appropriate Protection/Operation (P/O) LEDs.

Table 6. Fault Codes

Fault	Code	User Interface			Notes
		Mode LED	P/O LED	Display	
Number of restarts exceeded	1	Operation	Fault reset tries and load reset tries	rEt	Could result from excessive motor or load faults.
Remote off	2	None	None	rOF	Relay turned off (network or UI).
Contactor failure	3	Protection	Current unbalance %	F.03	Voltage and current phase loss.
Low power (kW)	15	Protection	Low power (kW)	F.04	—
Motor overload	5	Operation	Trip class	F.05	—
Ground fault	6	Protection	Ground fault (A)	F.06	—
Current unbalance	7	Protection	Current unbalance %	F.07	—
Current phase loss	8	Protection	Current unbalance %	F.08	Current phase loss without voltage phase loss.
Reserved	9	—	—	—	—
High power (kW)	10	Protection	High power (kW)	F.10	—
Overvoltage	11	Protection	Overvoltage (V)	F.11	—
Undervoltage	12	Protection	Undervoltage (V)	F.12	—
Voltage unbalance	13	Protection	Voltage unbalance %	F.13	—
Jam	14	Protection	Jam trip %	F.14	—
Undercurrent	4	Protection	Undercurrent %	F.15	—
Phase rotation	16	Protection	Phase rotation	F.16	—
Other	—	—	—	—	Consult user manual.

Display messages

The following display messages may appear on the Motor Insight overload relay user interface to indicate status.

Table 7. Display Messages

Message	Description
rOF	The relay has been turned off.
rSt	The Restart Delay is timing down. Caution—an auto-reset attempt is pending.
rEt	The number of auto-resets attempts has been exceeded. A manual reset is required.
ub	A voltage unbalance has been detected. This message will flash with the displayed parameter in the alarm-no-trip mode.
HI	A high voltage condition has been detected. This message will flash with the displayed parameter in the alarm-no-trip mode.
LO	A low voltage condition has been detected. This message will flash with the displayed parameter in the alarm-no-trip mode.
1PH	A voltage phase loss condition has been detected. This message will flash with the displayed parameter in the alarm-no-trip mode.
gnd	A ground fault condition has been detected. This message will flash with the displayed parameter in the alarm-no-trip mode.
OFF	The protection parameter is disabled.
999	The display parameter exceeds the display range.

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